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JAPAN'S GROWTH PERFORMANCE OVER THE LAST DECADE
A STUDY BY BRUCE KASMAN OF THE FEDERAL RESERVE BANK OF NEW YORK*

Summary

Why has economic growth in Japan, particularly the expansion of domestic demand, slowed down in the 1980s? Given the Reagan administration's recurrent calls for faster internal Japanese growth, this question is not merely of academic interest. Bruce Kasman of the Federal Reserve Bank of New York's Research and Statistics Group argues in the following article that declining rates of capital formation and technological progress are the fundamental causes of the slowdown. Both of these trends are associated with economic maturation, but the author finds that the slower rate of capital accumulation since 1980 can be traced in part to restrictive fiscal policies. Mr. Kasman concludes that real growth in excess of 4 percent a year is feasible in the near term, but he adds that domestic demand will have to expand at a much faster rate if Japan's trade surplus is to be reduced.

Introduction

From 1980 through early this year, Japan's economy expanded at an average annual rate of 3.75 percent. Although this pace exceeds that of any other industrial nation, Japan's performance has been generally viewed as disappointing. Economic growth has been substantially below the 5 percent annual rate it achieved during the second half of the 1970s, and only about 40 percent of the growth rate in the decade before the first oil shock. Moreover, domestic demand

*Reprinted from Federal Reserve Bank of New York, Quarterly Review, Summer 1987, pp. 45-55.

expansion has fallen significantly short of overall economic growth -- a gap reflected in Japan's large and growing external surpluses with the rest of the world.

The reasons for the growth slowdown and its implications are currently the subject of widespread controversy. It is generally acknowledged that a substantial slowing from the exceptionally rapid rate of expansion during the 1950s and 1960s was inevitable; as the economy matured, the impetus from "catching-up" to other industrial countries would eventually diminish. What is not clear, however, is the extent to which this process can account for the recent slowing in Japanese growth. According to one view, the deceleration of rates of expansion during the 1980s reflects a decline in Japan's capacity for growth that can be principally attributed to continued economic maturation. Many observers, however, take issue with this view and argue instead that policies restricting domestic demand have played a significant role in depressing economic activity. They believe that an acceleration of both output and demand growth in the coming years is necessary if Japan is to utilize its labor and capital resources fully and reduce its external imbalance.

This article examines the slowdown in Japan's growth, assessing the economy's performance over the last decade and the implications that it holds for the future. After a description of the changing trends in output and domestic demand since the 1960s, the analysis focuses on the estimation of the economy's potential or capacity rate of growth and the factors underlying it. Such estimates provide a useful standard for evaluating the actual performance of output as well as domestic demand, because in the long run both must grow at the same rate as potential.

The results indicate that Japan's current potential growth rate is in the range of 4 to 4.5 percent annually, significantly lower than it was in the 1970s, but considerably above the actual average performance since 1980. Both the normal maturation of the economy and restrictive demand policies appear to have played a significant role in the growth experience of Japan since the mid-1970s. The slowdown in potential growth substantially reflects a decline in rates of capital formation and technological progress as the economy has matured. Nonetheless, since 1980, a policy of sustained fiscal austerity contributing to sluggish domestic demand growth has placed a substantial drag on economic activity.

The Japanese Growth Experience: An Overview

The pattern of Japan's growth changed dramatically in the mid-1970s (Chart 1). From the mid-1950s to the early 1970s real gross domestic product (GDP)[1] grew at a remarkable rate of over 10 percent annually, at least twice

[1]Real gross domestic product measures all goods and services produced in Japan. GDP was considered a more appropriate standard of growth than the alternative real gross national product, a measure of all goods and services produced by Japanese residents, including income derived from production based abroad.

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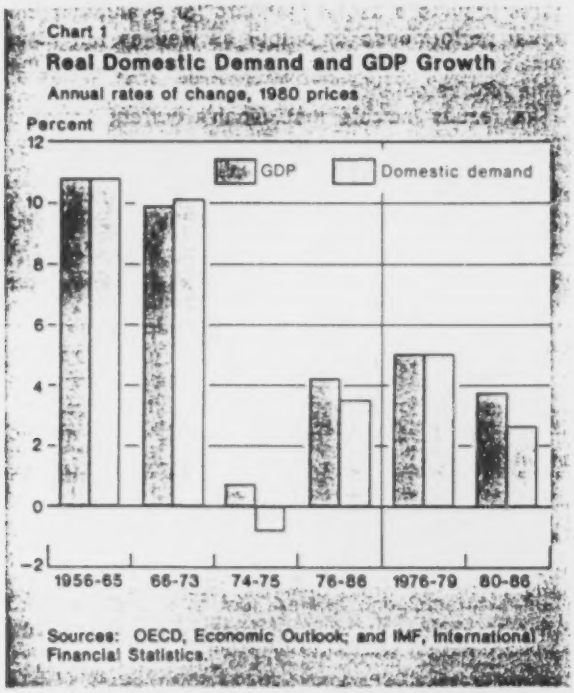
that of other major industrial economies. Following the first oil price shock, however, the trend rate of output growth fell sharply, to an annual rate of 4.2 percent over 1976-86. Furthermore, recorded growth has continued to decelerate over this decade, from roughly 5 percent during the latter half of the 1970s to 3.7 percent over 1980-86; over the past two years (1985-1 to 1987-1), the economy's rate of expansion has declined to 3.3 percent per year.



Substantial as the deceleration of output growth rates has been, domestic demand growth has slowed even further. Throughout the 1950s and 1960s domestic demand grew on average at the same pace as output. However, beginning in the early 1970s, demand growth began to fall short of output, a pattern that has become increasingly pronounced since the late 1970s. Indeed since 1979, Japan's domestic demand has, on average, lagged a full percentage point behind the pace of output growth. As a result of these developments, Japan's external payment (current account) surplus has widened dramatically to over 4 percent of GDP in 1986.

This striking decline in underlying trends of output and demand, confirmed by formal statistical analysis,[2] has generated a wide range of views

[2]To identify structural change in growth patterns, the logarithm of gross domestic product and total domestic demand were regressed on a time trend from 1966-I to 1985-IV. Standard statistical tests were employed to test for structural homogeneity between subperiods of the sample. Statistically significant shifts in the slope of trend lines for output and demand can be detected during the mid-1970s; no further significant shifts are identified following 1975. Application of a likelihood ratio test developed by Quandt (R.E. Quandt, "Tests of the Hypotheses That a Linear Regression Obeys Two Separate Regimes," Journal of the American Statistical Association, Vol. 55 (1980), pp. 334-339) identified 1974 as the year structural change took place in both demand and output.

about its causes and implications. One explanation, suggested by the timing of the shift in growth rates, attributes the slowdown to the two major oil price increases of 1974 and 1979. Indeed, these oil price shocks were substantially responsible for the subsequent cyclical downturns in real growth in Japan as well as other major industrial countries.[3] Japan experienced its first recession of the postwar era in 1974 in the aftermath of the sharp rise in oil prices. A similar but more modest slowdown in growth took place following the second energy price shock.[4]

Nonetheless, there are reasons to doubt that, aside from their temporary cyclical impacts, the oil price shocks could be responsible for the large persistent decline in Japan's trend rate of growth over the past decade. Germany and several other European countries are also heavily dependent on oil imports, yet their growth over the last decade has not slowed nearly as rapidly as that of Japan. The deceleration of trend rates of output and demand growth since 1973 has ranged between 1 and 3 percent for OECD nations; Japan's trend rate of output growth has declined by close to 6 percent. Furthermore, while most industrial economies rebounded to their prior rates of growth during the cyclical recovery in the second half of the 1970s, Japanese growth peaked at a level less than two-thirds of its average over the decade prior to 1974.

It appears, then, that other factors, more specific to Japan, have played the key role in the decline it its underlying growth trend. Almost certainly, an important contributor has been the maturation of Japan from its relatively underdeveloped state immediately after the Second World War to the world's second largest industrial nation. As with many developing economies, Japan's rapid expansion during the initial stage of its industrialization was in large part a reflection of the substantial gaps between its own capital stock and technology and those of the more mature industrial economies. In the process of "catching up," Japan's performance was enhanced considerably by factors that include the integration of superior technologies from abroad into production, the rapid growth of the capital stock from an initially low base, and efficiency gains from reallocation of the labor force from low productivity sectors (agriculture and nonfarm self-employment) to high productivity manufacturing industries.

[3]In Economics of Worldwide Stagflation (Harvard University Press, Cambridge, Mass., 1985), M. Bruno and J.D. Sachs provide an excellent synthesis of much of the literature regarding energy price shocks and their effect on macroeconomic performance in the industrial world.

[4]Japan's growth slowdown following the second oil shock was relatively mild in comparison with that of other industrial economies. This is often attributed to the flexibility exhibited in Japanese labor markets during this period. See Bruno and Sachs, Worldwide Stagflation, for an interesting contrast between the labor market adjustment (and policy response) in Japan and the United Kingdom following the second oil shock and the performance of the two economies. In "Japan's Macroeconomic Performance since the First Oil Crisis: Review and Appraisal," Carnegie-Rochester Conference Series on Public Policy, Vol. 20 (1984), R. Komiya and K. Yasui provide an in-depth analysis of the economy's performance during the two oil shocks.

However, contributions from such sources tend to diminish and eventually are exhausted as an economy matures, leading to a decline in its growth capacity. Indeed, Edward Denison and William Chung, in a study of Japanese growth from 1951 to 1971, estimate that over two-thirds of national income growth was due to transitory factors associated with Japan's rapid industrialization.[5] In their analysis they predicted a steady deceleration in Japan's trend growth rates during the 1970s and beyond as the maturation process continued. The experience of West Germany also provides a historical parallel to the slowing of Japanese growth. West Germany began to rebuild its economy after the Second World War (although its initial position was higher than that of Japan) and sustained an annual growth rate exceeding 7 percent during the 1950s and early 1960s, and growth rates subsequently fell, to an average of 4 percent annually during 1966-73 and less than 3 percent over the past decade.

These considerations strongly suggest that factors related to maturation are responsible for much of the slowdown in Japan's growth during the past decade. The maintenance, until recently, of low unemployment rates and apparently high levels of factor utilization rates despite a significant slowing in growth is consistent with this view of Japan's performance.

The divergence of domestic demand from output growth during the past decade cannot easily, however, be accounted for by the forces of maturation. Indeed, many observers contend that the weak performance of demand has played a significant independent role in deceleration in output growth. According to this view, the slowdown in demand has decreased output growth below its potential and has led to the accumulation of excess capacity not reflected in published indicators of the cyclical position of the economy.

The historical record suggests that restrictive macroeconomic policies have contributed to the deceleration in domestic demand growth during the past decade. A monetary contraction aimed at reducing rising rates of inflation during the early 1970s was a key factor in the slowdown in domestic demand, at least through 1977. This was offset somewhat by an expansion in fiscal policy during the period 1976-79. Since 1979, however, fiscal policy has turned sharply towards a contractionary stance while monetary policy can be seen as broadly neutral. The general government deficit as a share of GDP has fallen from a peak of 5.5 percent in 1978 to less than 1 percent in 1986, as public sector demand has slowed sharply. At the same time, monetary authorities have continued to moderate expansion in their favored monetary aggregate (M2 + CDs). This measure of broad money has grown by 8.3 percent per year since 1981, compared to 11.7 percent during 1976-80.

To argue that demand factors have been significant does not, of course, imply that maturation forces have been of little consequence; indeed both seem to have influenced Japan's performance. It is important, however, to quantify their relative contributions to the slowdown in order to assess the economy's recent performance. This task requires a standard against which actual growth performance can be assessed, in particular, a measure of an economy's potential growth in capacity. In the next section, we provide estimates of Japan's potential growth over the past two decades. These estimates are arrived at by

[5]E.F. Denison and W.K. Chung, How Japan's Economy Grew So Fast (Brookings Institution, Washington, D.C., 1976).

measuring the sources of Japanese growth and analyzing their evolution over time. Once the factors that have contributed to growth are quantified, longer-term processes determining underlying rates of output and demand growth become apparent. In addition, the understanding of Japan's historical experience that emerges from this analysis provides insights into the nation's prospects for growth in the coming years.

Estimating Potential Growth

An economy's potential rate of output growth measures its maximum sustainable rate of expansion. This rate is determined by the growth in productive resources (capital and labor), together with the rate of advance in their productivity. Over time, output growth that is persistently below potential will lead to the buildup of excess capacity, whereas growth persistently in excess of potential will tend to raise factor utilization rates above their normal levels and fuel inflationary pressures. Thus, maintaining the economy on its potential growth path is generally viewed as a desirable macroeconomic policy goal. In addition, potential rates of growth provide a standard for assessing the growth of domestic demand: an economy can maintain a stable external balance (relative to GDP) only if domestic demand grows at the same rate as output.

Actual growth rates in an economy vary around potential as a result of any number of factors that temporarily affect demand or supply. During a cyclical downturn, for example, output normally declines as unemployment rates rise and a portion of the capital stock is rendered idle. Generally, the resultant slowdown in income growth leads to a corresponding decrease in demand. During recovery, output and demand growth will likely exceed potential as underutilized resources are brought back into the production process. Therefore, when viewed over a long enough horizon, an economy's average rate of growth can be expected to reflect its potential.

This insight provides the basis for a standard approach to measure potential. Once actual growth rates are smoothed over several business cycles, the average between successive peaks can be employed as an estimate of capacity growth rates.[6] However, as our discussion thus far suggests, an approach of this type may be misleading when applied to Japan's experience over the past decade. To the extent that persistently weak demand depressed the economy's rate of expansion, averaging rates of actual output growth, even after adjusting for fluctuations around trend, may significantly underestimate the true potential for growth.

A more fundamental approach, employed here, considers the sources of Japanese growth and their change over time. This approach is particularly relevant for the case of Japan because the sources of potential growth have likely undergone a considerable change as maturation has proceeded. In particular, the economy's labor input (total man-hours worked) has risen substantially more rapidly over the past decade than during the prior 1967-73 interval

[6]For a detailed discussion of this as well as alternative approaches, see L. Christiano, "A Survey of Measures of Capacity Utilization," IMF Staff Papers, No. 1, 1981, pp. 144-198.

(Table 1).[7] In contrast, labor productivity growth has undergone a remarkable decline since the mid-1970s. Clearly, the causes of this decline need to be identified if Japan's potential growth is to be determined.[8]

Table 1: Output and Productivity Growth

(Annual Rates of Change)

	1967-73	1976-86	1976-79	1980-86
Real gross domestic product (constant 1980 prices)	9.2	4.2	5.0	3.7
Labor productivity (GDP/man-hour)	8.7	3.0	3.2	2.9
Total man-hours worked	0.5	1.2	1.8	0.8

In the approach taken here, we consider the relationship linking an economy's rate of output growth to its capacity to accumulate labor and two important components of labor productivity growth: the rate of capital accumulation and the rate of growth of general technological progress.[9]

Output growth = (capital stock growth)S_K
+ (labor input growth)S_L
+ rate of technological progress.

S_K and S_L measure the elasticity of output with respect to capital and labor respectively. Since production is reasonably approximated by a constant returns to scale technology, these elasticities can be interpreted as the respective output shares of the factors. Technological progress measures the average productivity increase of the labor and capital inputs in this framework and incorporates all components of growth not due to the measured accumulation of these factors.

[7]Part of the sharp increase in labor force growth during the second half of the 1970s reflects a cyclical recovery following the recession of 1974-75. However, even if we incorporate these effects, we find a significant shift in trend rates of growth of total man-hours worked. The causes of this shift are discussed in the appendix.

[8]Another approach, based on estimating Okun's law relationships for Japan, was investigated, but it proved to be unreliable because of the unstable relationship between labor input growth and productivity since 1974.

[9]This approach is similar in methodology to that taken by J.R. Artus in "Measures of Potential Output in Manufacturing For Eight Industrial Countries 1955-1978," IMF Staff Papers, Vol. 24 (1977), pp. 1-35, and similar in spirit to the growth-accounting approach pioneered by Denison. See E. Denison, Accounting for Slower Growth: The United States in the 1970s (Brookings Institution, Washington, D.C., 1979).

As we explain in detail in the accompanying appendix, measuring potential output growth involves two steps. In the first, a relationship between the actual level of output and existing factor inputs, adjusted for rates of utilization, is estimated. This allows us to determine the underlying rate of technological progress and the elasticities necessary to account for each factor's contribution to potential growth. For example, if the elasticity of output with respect to capital is estimated at one-half (as our analysis suggests), then every one percentage point growth in the capital stock contributes 0.5 percent to output growth. In the second step of this procedure, these parameters, together with estimates of the underlying trend rate of capital accumulation and the increase in the labor input, are used to estimate Japan's potential growth and its primary sources.[10]

The results, summarized in Table 2, suggest that there has been an ongoing and substantial deceleration in Japan's potential growth rate during the past two decades, from about 9 percent per year during 1967-73 to roughly 4.5 percent over 1976-86. Moreover, Japan's potential growth has continued to decline over the last decade, falling from estimates of 5 percent during 1976-80 to 4 to 4.5 percent in recent years. Although these estimates reflect the particular assumptions underlying the analysis and should not be viewed as precise measures of potential, the general pattern of decline was consistently displayed under a wide variety of conditions and appears to present a reliable indication of the evolution of Japan's capacity for growth.[11]

The Sources of the Potential Growth Slowdown

The deceleration in Japan's potential growth over the past two decades can be attributed to two major sources. The most important has been a substantial slowing in the rate of capital accumulation from a growth rate of 13 percent during 1967-73 to roughly 6 percent during 1976-86. As a result, capital's contribution to potential declined by more than 3 percentage points, accounting for over two-thirds of the deceleration in potential growth. In addition, the rate of technological progress has declined. Advances in average factor productivity contributed about 2.5 percent to potential growth per year from 1967-1973, but have since fallen to just under 1 percent. Together these factors account for the entire deceleration in potential growth rates, more than offsetting a modest positive contribution to potential from the acceleration in the growth of total man-hours.

[10]No attempt is made to account for Japan's potential growth rate during 1974-75. Large structural shocks brought on by the first oil shock likely lowered the level of the economy's potential output during this period and may temporarily have altered the potential growth path. Although measurement of this effect is important for determining the current level of potential output, it does not bear significantly on our estimates of potential growth rates over the decade following 1975.

[11]In a recent IMF study that employs a comparable approach (C. Adams, P. Fenton and F. Larsen, "Potential Output in the Major Industrial Economies," Staff Studies for the World Economic Outlook, forthcoming), the authors identify a qualitatively similar pattern of decline in Japan's potential growth rate. Their estimates differ, however, particularly in regard to the contribution of the sources of potential growth. This inconsistency reflects the different assumption on which the two studies are based.

Table 2: Composition of Japanese Potential Growth, 1967-86

(Annual Rates of Change, 1980 Prices)

	Potential Growth Rate	Percent Contribution to Potential Growth			Potential Labor Productivity Growth Rate
		Labor Input	Capital Input	Technological Advance	
1967-73	9.0	0.1	6.5	2.4	8.8
1967-69	10.8	0.1	6.1	4.6	10.6
1970-73	7.8	0.1	6.8	0.9	7.6
1976-86	4.5	0.5	3.2	0.8	3.4
1976-80	4.9	0.5	3.7	0.7	3.8
1980-86	4.1	0.5	2.8	0.8	3.0
Memo: alternative estimate of potential.*					
1981-86	4.6	0.5	3.3	0.8	3.5

*In determining the potential rate of capital accumulation through this approach, we assume that the historical patterns of investment and savings ratios over 1966-80 are maintained.

Both the slowdown in technical advances and decline in rates of capital formation are largely attributable to maturation. In particular, the gains from labor reallocation and from the closing of the technological gap between Japan and other industrial nations have largely been exhausted. An end to this "catching-up" process appears behind the decline in rates of technological advance. In addition, the working of longer-term factors consistent with an economy's natural development -- rising depreciation rates and diminishing returns to capital -- can explain the major part of the decline in rates of capital formation.

Japan's potential growth fell from close to 11 percent to below 8 percent over 1967-73, a reduction that our estimates suggest is entirely attributable to a slowdown in technological advances. As noted earlier, our measure of technological growth is essentially a residual incorporating all components of potential growth not embodied by measured changes in labor and capital. Consequently, the sources of Japanese growth related to the nation's efforts to catch up, including the more efficient allocation of resources, the incorporation of new technologies, and the improvements in factor quality, are likely to be captured in the large estimate of technological advance during this period. The sharp decline in rates of technological advance over 1967-73 might then be interpreted as a reflection of the rapid closing of the technological gap between Japan and other industrial nations.[12] This view is reinforced by the

[12]Because of the approximate nature of our measures of factor inputs and rates of capacity utilization, estimates of technological progress based on a residual must be viewed with caution, especially for the shorter subperiods of our sample. In particular, the implausibly abrupt slowdown in technological progress estimated from 1968 to 1973 should not be taken literally. Instead, it is probably more appropriate to take these estimates as indicative of trends rather than precise levels.

fact that during the mid-1970s the contribution from this component stabilized to a level comparable to those of other industrial countries.[13]

The more moderate slowing of potential growth that has continued since the mid-1970s is essentially a reflection of an ongoing deceleration in rates of capital accumulation. The decline in capital's contribution to potential growth that has offset a more modest increase in labor force growth is also largely explained by the maturation of the economy. However, restrictive fiscal policies appear to have contributed significantly to the slowdown during the 1980s.

To understand the factors underlying these trends, note that the rate of capital accumulation is effectively determined by four components: the savings rate of an economy as measured by the rate of national savings to GDP; the portion of national savings flowing to domestic investment (rather than abroad); the portion of gross investment available for new capital formation as opposed to replacement; and the ratio of output to the capital stock itself.

$$\text{Percent Growth of the Capital Stock} = \frac{\text{Net Investment}}{\text{Gross Investment}} \times \frac{\text{Gross Investment}}{\text{National Savings}} \times \frac{\text{National Savings}}{\text{Output}} \times \frac{\text{Output}}{\text{Capital Stock}}$$

Trends in the determinants of capital accumulation are presented in Table 3. As the table suggests, both the net to gross investment ratio and the output-capital ratio (the first and fourth items in the identity and Table 3) have exhibited a pattern of persistent decline, accounting for nearly all of the decline in rates of capital accumulation from the late 1960s through 1980. In contrast, national savings rates and the economy's utilization of its domestic savings remained fairly stable until the 1980s and hence were not significant factors in capital's declining contribution to potential growth in the 1970s.

Underlying this slowdown are two forces that naturally tend to lower rates of capital accumulation as an economy matures. First, as an economy industrializes, its capital stock is likely to grow relative to other factors of production. Eventually this process will lead to diminishing returns in output for a given addition to capital stock, and consequently the ratio of output to capital will fall. However, a declining output-capital ratio requires that an increasing share of output be allocated to investment in order to maintain constant rates of capital accumulation. Thus, if an economy maintains stable investment and savings shares, rates of capital formation (and consequently rates of output, savings and investment growth) will eventually exhibit a pattern of decline.

[13]The IMF study cited earlier (Adams, Fenton and Larsen, "Potential Output") arrives at the same conclusions. Their estimate of Japan's current rate of technological growth (1.6 percent per year) is well within their current range of estimates (0.75 to 2.25 percent) for the major industrial economies.

Table 3: Determinants of Japan's Rate of Capital Accumulation*

(In Percentage Points)

	1968-73	1976-80	1981-86
Annual growth of capital stock	13.2	6.8	5.3
Net investment as a share of gross investment	53.3	45.5	38.1
Gross investment as a share of national savings	83.4	80.8	74.9
National savings as a share of gross domestic product	31.4	30.1	33.2
Gross domestic product as a share of the capital stock	95.0	61.6	55.5

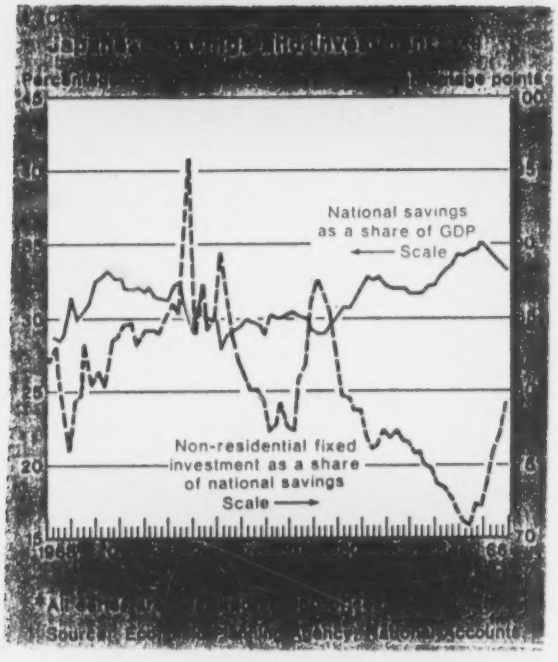
*Estimates of capital stock growth and net and gross investment flows are based on our estimates of the potential rate of capital accumulation as described in the appendix. The total growth of capital stock is equal to the product of the underlying components (expressed in fractions).

The second factor that has contributed to the slowdown in rates of capital formation is the general tendency for a greater share of investment to be devoted to replacing depreciating capital over time. Depreciation expenditures can be expected to rise as an economy's capital stock grows; they generally absorb a larger share of gross investment expenditures in more mature economies. Based on measures of consumption of fixed capital from published national income accounts, depreciation as a share of gross fixed capital formation currently stands at about one-half in Japan compared to two-thirds for the United States. The estimates used to measure potential growth indicate that depreciation expenditures as a share of gross investment have nearly doubled over the past two decades and are a major factor in the decline of the net to gross investment ratio.

Investment Demand and Capital Accumulation in the 1980s

While these longer-term forces have continued to play a role in the slowing of potential growth during the 1980s, the deceleration in the rate of capital accumulation has been augmented by a sharp decline in the rate at which Japan utilizes its domestic savings. The rate at which the economy utilized savings fell steadily from 1979 to 1985, more than 15 percent from peak to trough (Chart 2).[14] This decline is reflected in the increasing share of Japan's savings exported, via widening current account surpluses, over the period.

[14]The ratios in Chart 2 are presented in real terms (all variables are in 1980 prices), reflecting our concern with their relation to real rates of capital formation. The nominal counterparts of these ratios are of somewhat different magnitude but exhibit a similar decline in the utilization rate of domestic savings during the 1980s.



Conceivably, the increasing tendency to invest savings abroad could also indicate maturation, in particular an underlying decline in the profitability of domestic investment opportunities. However, the observed pattern of the components of investment demand during this period suggests that maturation cannot provide the major explanation for this phenomena. Trends in private investment demand growth offer no evidence of a generalized fall in returns to capital; private investment demand growth has accelerated in recent years although interest rates have risen and other components of domestic demand have slowed. In contrast, there has been a sharp contraction in public sector capital outlays that has resulted in a slowing of aggregate investment demand growth. Taken together, these trends suggest that at least part of the deceleration in rates of capital accumulation during the 1980s can be traced to restrictive demand policies.

Evidence for this interpretation is presented in Table 4. Total nonresidential fixed investment (our input to potential capital accumulation) has grown more slowly during the 1980s, both in relation to the experience of the second half of the 1970s and the decade prior to 1974. However, after expanding at a rate roughly similar to that of private sector investment from 1968 to 1980, public sector investment contracted by 0.8 percent per year over 1981-86. Private investment demand, in contrast, grew by 6.7 percent during this time, a faster pace of growth than that recorded from 1976 to 1980. Thus, a major component of this decade's lower rates of utilization appears to be tied to fiscal policy actions that increased the national savings rates, in part by directly depressing rates of capital formation.

Table 4: Output and Productivity Growth

(Annual Rates of Change)

	1968-73	1976-86	1976-80	1981-86
Total non-residential fixed investment	13.3	4.6	5.0	4.2
Public sector	13.5	1.8	5.0	-0.8
Private sector	13.2	5.9	5.0	6.7
Export-oriented*	5.7	15.5	18.7	12.3
Other*	14.2	4.1	3.6	5.6

*Fiscal year figures. Export-oriented industries include general and electrical machinery, transportation equipment and precision instruments. Most recent period encompasses 1981-85.

Sources: OECD, Economic Outlook; Japan Economic Research Center, Five Year Economic Forecast, various years; and Federal Reserve Bank of New York estimates.

In addition, a shift in the composition of private investment demand can be observed. Private investment expenditures have been increasingly directed toward export-oriented sectors where investment demand has grown more than twice as rapidly as in other sectors. To some extent this shift reflects a structural change in the Japanese economy in the direction of low-energy-intensive production following the first oil price shock. However, the continued divergence of investment growth between domestic and export-oriented industries is at least consistent with the view that the slowing in public sector demand may have depressed aggregate investment demand in recent years. It also raises the issue of how the significant changes in the foreign environment facing the Japanese economy during the 1980s have impacted on domestic investment behavior.[15]

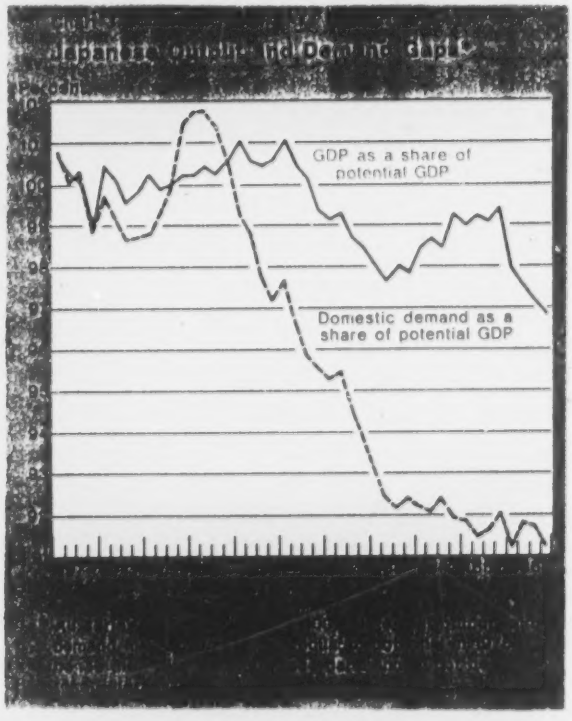
Because the evidence suggests that trends in investment demand may not have reflected accurately Japan's potential for capital accumulation in recent years, we consider an alternate measure. In this approach, the historical utilization rate of domestic savings is employed as a long-term constraint on the economy's ability to accumulate capital. While the use of this measure has virtually no impact on our estimates of potential growth before 1980, the results, presented in Table 2, suggest that Japan might have been able to grow at a rate of slightly more than 4.5 percent over 1981-86 if it had continued to utilize its savings according to historical trends.

[15]The increase in foreign demand for Japanese goods brought on by the depreciation of the yen relative to the dollar during the 1980s has likely, through the accelerator effect, stimulated domestic investment demand, particularly in export-oriented sectors. On the other hand, the higher interest rates abroad that accompanied the shifting composition of demand may have slowed domestic investment demand by stimulating the export of domestic savings and pushing up the domestic cost of capital.

Japan's Recent Economic Performance

Our estimates of the economy's potential clearly imply that the deterioration in Japan's output growth performance since the mid-1970s is primarily the result of a slowing in potential growth rates. Indeed, output and demand grew somewhat faster than their long-term paths during the second half of the 1970s. However, recent years have witnessed a slowing in output and particularly demand in relation to potential. As a result, significant imbalances currently exist in the economy, implying a very different pattern of growth in the coming years.

The economy's performance is illustrated in Chart 3, where domestic demand and output growth are related to the economy's estimated potential growth path over the past decade. From 1976 to 1979, average growth of both demand and output exceeded potential This result is not surprising, however, because at least initially, Japan was recovering from its most severe downturn of the postwar period. Because of the sharp cyclical swings experienced during the early 1970s, a period in which over-expansion in 1972-73 was followed by recession in 1974-75, the economy's actual performance during the 1970s masks the steady slowing of potential growth rates throughout the decade as well as the return by 1977 of the economy to its long-term growth path.



During the 1980s Japan's potential rate of growth continued to decline, although at a slower rate than over the prior period. However, the economy's actual growth slowed even more substantially. Output lagged behind our lower bound estimates of potential by about three percentage points during the decade as a whole. Domestic demand grew even more slowly, falling nearly nine percentage points relative to potential and nearly six percentage points relative to actual output over the same period.

It is reasonably clear from these trends that the marked slowdown in demand growth relative to its long-term path was a substantial and persistent drag on activity throughout the 1980s. As indicated earlier, the shift to a policy of fiscal austerity undertaken in 1979 was a major factor behind the weakening demand performance. Spurred by a contraction in public sector investment, total public sector demand has grown at an annual rate of less than 1 percent since 1979, compared to 6.1 percent over 1976-79. In contrast, private demand growth has been considerably more robust; indeed household savings rates have actually declined, and since 1980, private investment demand has expanded more rapidly than its average of expansion during 1976-79.[16]

The slowing of domestic demand growth would have led to a much more substantial shortfall of actual relative to potential output had it not been for the substantial rise in external demand for Japanese output during the 1980s. The effects of increased external demand for Japanese goods, offsetting the sluggish performance of the economy's domestic demand, enabled the economy to grow at rates close to its potential for much of the decade and kept excess capacity at fairly modest levels -- at least until the last year. The impact of rising external demand was particularly important from 1983 to 1985, when output grew faster than potential at the same time that the gap between domestic demand and potential output continued to widen. Japan's external sector contributed 1.5 percent to output growth per year from 1980 to 1985, more than three times its average contribution over the previous two decades.

Our analysis of the economy's recent performance has several implications for the pattern of Japan's growth in the future. First, the estimates presented here suggest that Japan's capacity for growth in the coming years is roughly equal to its average rate of expansion during 1976-86. While the slowdown in potential that has taken place over the past decade makes it unlikely that the economy can return to the growth performance it achieved during the late 1970s, there is scope for an acceleration in output growth beyond that recorded recently. Our estimates indicate that growth in excess of 4 percent per year, roughly 0.5 percent faster than Japan's average performance since 1980, can be sustained without risking an acceleration of inflation.

A more radical expansion in the rate of domestic demand growth will be required, however, if the economy is to expand at full capacity. The recent pattern of considerably slower growth in demand than output clearly cannot be sustained because it would require that exports consume an ever increasing share of Japanese output. Therefore, at some point, Japan's external position must stabilize. Even if Japan's external surpluses remain at the current levels relative to GDP, an acceleration in demand growth to rates consistent with current rates of potential will be necessary to prevent the accumulation of excess capacity. By itself, this finding implies that demand must grow by roughly 1.5 percent above its average performance since 1980. Most observers

[16]Private consumption demand has slowed during the 1980s relative to its rate of expansion during the second half of the 1970s. However, this development is due in large part to the rapid growth in government tax revenues. Household consumption as a share of disposable income has risen steadily in recent years, averaging close to 84 percent from 1981 to 1986 (compared to 80 percent from 1975 to 1980).

would agree, however, that some reduction in Japan's net exports to output ratio must occur in the coming years. Such a reduction would require a negative contribution from the external sector during the adjustment period. Under these conditions, a rate of domestic demand growth that is in excess of the economy's potential and considerably faster than demand's performance over the past decade will be necessary to maintain output on its long-term path while facilitating external adjustment.

Conclusion

There seems to be little doubt that both the normal maturation of the economy and restrictive demand policies have been important factors in the slowdown in Japanese growth since the mid-1970s. As a result of natural declines in rates of capital formation and technological progress associated with Japan's maturation, potential growth rates have steadily fallen during the past two decades. At present, potential growth appears to be in the range of 4-4.5 percent annually, less than half the rate over the period 1967-73. Actual average growth performance over the last six or seven years has fallen short of even the lower bound of the economy's potential.

Perhaps more importantly, domestic demand growth in Japan has been significantly weaker than overall growth, largely reflecting a policy of sustained fiscal austerity. The fiscal drag on economic activity has been offset, to a substantial extent, by a stimulus to demand from the historically unprecedented foreign trade surpluses.

In the coming years, Japan will be faced with the difficult challenge of correcting the accumulated external imbalances of the past while attempting to achieve or maintain growth near potential levels. Our estimates suggest that a moderate increase in the rate of output growth above recent performance can be sustained without the risk of fueling inflationary pressures. However, performance at full capacity alone will not be sufficient to ensure adjustment of external sector imbalances. A more dramatic and prolonged acceleration of domestic demand growth, well in excess of the pace in recent years, will be necessary if Japan is to make substantial progress in reducing its foreign trade surpluses.

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Appendix: Estimating Japanese Potential Growth

This section describes the methods used to estimate Japan's potential growth. Potential growth is considerably harder to measure than to define because of the difficulty of accurately quantifying its basic determinants and identifying their underlying trends.

The analysis is based on a standard "production-function" relation between the level of the economy's output and its capital and labor resources.

Returns to scale and factor shares are taken to be constant, an assumption usually found to be a reasonable approximation at this aggregate level.[1]

$$Q_t = Ae^{r_1 t}(c_t K_t)^{\alpha} L_t^{1-\alpha} \qquad (A.1)$$

where: Q_t = actual level of output
r_1 = time trend of technological change
K_t = capital stock
L_t = labor input (total man-hours worked)
c_t = utilization rate of the capital stock
α, $1-\alpha$ = factor shares of capital and labor, respectively

A major difficulty in applying this method is that any measure of aggregate factor inputs is, at best, a rough approximation. In order to represent an economy's productive process by a single equation, various inputs and outputs are aggregated into a few composite variables. In addition, the analyst must rely on proxies to account for changes in the degree of intensity of the factors used. In Japan's case, this procedure is made particularly difficult by the inapplicability of the common proxies (unemployment rates and rates of capacity utilization).

Fairly standard techniques were employed to measure factor inputs. The capital stock, defined as all nonresidential structures and machinery, is measured through a simple perpetual inventory method that considers gross fixed nonresidential investment as the economy's addition to its capital stock.[2] Obviously the capital stock is not always utilized at its normal rate, and some adjustment to measure the actual input of capital in each period is required. After experimenting with different techniques to estimate the utilization rate of capital, we chose a weighted average of growth during the past four quarters relative to average growth rates during the past two and a half years.[3] We assume that normal utilization rates are achieved when this ratio equals one. The economy's labor input is estimated by total man-hours worked in all industries, and our estimates of technological change are captured by time trends that incorporate all systematic components of growth not measured by capital stock and labor input growth.

[1]A production technology that assumes constant factor shares for capital and labor is known as "Cobb-Douglas." It also implies constant elasticities of output with respect to each productive factor. The Cobb-Douglas function is often employed when estimating potential growth because it allows for a clear-cut identification of the individual sources of potential growth.

[2]The capital stock, measured in 1980 prices, is increased by gross fixed nonresidential investment (INV) minus an assumed 8 percent annual rate of depreciation. The formula for the change in the capital stock, on a quarterly basis, is $K_t - K_{t-1} = I_t - .02K_{t-1}$, where: $I_t = .3INV_{t-1} + .5INV_{t-1} + .2INV_{t-3}$. Denison and Chung's estimate of net capital in 1955 was used as a benchmark.

Quarterly data from 1966-I to 1985-IV were used in the estimation process. A primary consideration in the estimation was the identification of structural shifts in factor shares and trend rates of technological change. Tests for structural stability of the relationships suggest a single break within the sample period at the end of 1973. The best-fitting equation estimates for equation A.1 are presented in Table A.

Table A: Regression Estimates of Japan's Production Function*

	1966-I to 1973-IV	1974-I to 1985-IV
Ln A	-.832	-.871
	(-6.6)	(-5.4)
α	.503	.539
	(4.8)	(7.04)
r_1	.016	.002
	(3.4)	(2.30)
r_2**	-.0003	--
	(4.2)	
Summary statistics		
R^2	.974	.920
SEE	.009	.005
Rho	.699	.846
DW	2.19	1.94

*All equations are estimated with Cochrane-Orcult correction for first order serial correlation. The estimated form was obtained by dividing equation (A.1) by the labor input and taking logs: $n(\ /L) = n A_t + n(cK/L) + r_t$. T-statistics are in parentheses.

**r_2 is a second order time-trend variable that captures the decelerating rate of disembodied growth during the first half of the sample period.

These estimates fit the data well, as the satisfactory goodness-of-fit statistics attest. In addition, the parameter estimates proved to be stable with respect to small changes either in our choice of sample period or in the assumptions required to measure the capital stock and its rate of utilization. The results suggest that no significant change has taken place in the production technology of Japan over time. Estimates of capital's share of output increased from 50 to 54 percent over the two subperiods of the sample. However, the underlying rate of technological progress exhibits a substantial slowdown, evidenced by the significance of a negative second-order time-trend variable from 1966 to 1973 that reflects a steady downward trend in the rate of technological progress during this period.

[3]Other estimates of capacity utilization rates, including indexes of operating ratios compiled by the Japanese Ministry of International Trade and Industry (MITI), were employed but did not perform as well as the chosen measure in estimation.

These estimates of factor shares and underlying rates of technological change provide a means to account for the sources of potential growth. For example, our estimate of a factor share of capital in the vicinity of 0.5 indicates that every 1 percent rate of growth in the economy's underlying rate of capital will contribute 0.5 percent to potential growth rates. A similar calculation can be made for labor; these estimates provide the basis for the contribution of factors presented in Table 2.

Obviously an estimate of Japan's potential rate of capital and labor inputs is required to complete the analysis. The potential level of the labor input was determined by regressing the log of total man-hours worked on a time trend. As in the case of production technology, a break in trend is identified at the end of 1973. The annualized trend rates of growth for total man-hours worked were 0.2 percent over 1966-73 and 1.1 percent from 1974 to 1986.

Two factors might account for this sharp increase in total man-hours worked: a rise in female participation rates and a reversal of the trend towards lower average hours worked in the economy. The rise in female participation rates can be explained by a combination of economic and cultural factors at work throughout the industrial world, reflecting longer-term shifts in labor inputs. In contrast, the increase in average hours worked in Japan is less easily explained and appears unique among major industrial nations. While this shift raises questions about the relationship between recent trends and Japan's underlying labor force growth, we refrained from an in-depth study of the labor input because it has not played a significant role in the slowing of output growth rates during the past two decades.[4]

Two techniques were used to estimate the potential rate of capital accumulation. First, time trends for total nonresidential fixed investment demand were estimated in a fashion similar to that used to estimate total man-hours worked. Our findings enabled us to estimate the potential rates of capital accumulation presented in Table 3. We also employed an alternative measure because it was not clear that the fitted trends in investment demand accurately captured the economy's potential to accumulate capital. Consequently, trends in nonresidential fixed investment demand were reestimated using the historical rate at which savings flows were utilized in that sector. This alternative procedure produced no change in the estimated rate of capital accumulation through 1980, but raised the estimate for 1981-86 by one percentage point above that based on simple trend-fitting.

Our estimates of Japan's potential growth rate and its sources from 1967 to 1986 can be found in Table 2. No attempt was made to present estimates of Japan's potential growth rate over 1974-75 for two reasons: estimates for this period were not essential to our analysis, and standard estimation procedures could not easily account for the large structural shock to the economy's level of potential output.

[4]K. Hamada and Y. Kurosaka, "Trends in Unemployment, Wages and Productivity: The Case of Japan," Economica, Vol. 53 (1986), Supplement, provides a more detailed discussion of trends in Japan's labor input.

NOTE

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Pages: 1-3, 5, 6